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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/815,621	03/23/2001	Mark Lynn Jenson	1327.007US1	5992

7590

09/18/2002

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EXAMINER

MUTSCHLER, BRIAN L

ART UNIT	PAPER NUMBER
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1753

DATE MAILED: 09/18/2002

7

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Applicati n No.

09/815,621

7C-7  
Applicant(s)

JENSON ET AL.

Examiner

Brian L. Mutschler

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**Th MAILING DATE of this c mmunicati n appears on the cover sheet with the correspondence address --  
Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM  
THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 27 August 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 40-58 and 78-135 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 40-58 and 78-135 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 March 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Pri rity under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Drawings*

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description:

- a. In Figure 7, the reference sign **714** is missing (page 29, line 9);
- b. In Figure 9A, the reference signs, **922**, **926**, **928** and **932** are missing (page 42, lines 8, 17, 18 and 22);
- c. In Figure 19A, the reference signs **1110** and **1110'** are missing (page 59, line 18);
- d. In Figure 26A, the reference sign 2320 is not shown (page 72, line 23);
- e. The reference sign **2400** is not shown (page 73, line 27); and
- f. In Figure 28C, the reference sign **2800'** is not shown (page 80, line 20).

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description:

- a. The reference sign **257C** is not described (Fig. 2C);
- b. The reference sign **16E** is not described (Fig. 16E)
- c. The reference sign **2323** is not described (Fig. 23 and 25A);
- c. The reference sign **2467** is not described (Fig. 24D);
- d. The reference signs **2543** and **2546** are not described (Fig. 25C);
- e. The reference sign **2563** is not described (Fig. 25F);

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- f. The reference signs **2518** and **2519** are not described (Fig. 26A);
- g. The reference sign **2791** is not described (Fig. 27L);
- h. The reference sign **2963** is not described (Fig. 29A);
- i. The reference signs **2966**, **2967** and **2968** are not described (Fig. 29C);  
and
- j. The reference signs **2914** and **2915** are not described (Fig. 29I).

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "**713**" has been used to designate both an end roll (page 28, line 29) and an assist source (page 29, line 13).

Reference character "**2207**" has been used to designate both an integrated device (page 63, line 26) and a different integrated device (page 64, line 7).

The reference character "**2430**" has been used to designate both a supercapacitor device (page 66, line 8) and an integrated circuit (page 66, line 8).

The reference character "**2540**" has been used to designate an Integrated circuit (page 71, line 8), a lower substrate (page 71, line 11), wires (page 71, line 11), a product package (page 71, line 18) and processed circuits (page 72, line 17).

The reference character "**2660**" has been used to designate both a receiving loop (page 73, line 18) and a layer-deposition system (page 74, line 5).

4. The drawings are objected because for the following informalities:

- a. Figures 15D, 15E and 16D should include reference numbers describing that which is being shown;
  - b. In Figure 15K, the reference sign "**11100**" should be changed to --**1100**--;
  - c. In Figures 16A and 16B, the same reference signs **1390** and **1392** should not be used for both figures (each drawing should be independent);
  - d. In Figure 17, the reference sign **1300** should be deleted because it does not match the description (page 58, lines 8-9);
  - e. In Figure 21A, please change the reference signs "**1800**", "**1920**" and "**1930**" to --**1900**--, --**1910**-- and --**1920**--, respectively;
  - f. In Figure 21B, please change the reference sign "**1940**" to --**1930**--; and
  - g. In Figure 26B, please delete the reference sign "**2460**".
5. Due to the large number of drawings in the application, Applicant's assistance is kindly requested to correct any additional errors in the drawings.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

### ***Specification***

6. The disclosure is objected to because of the following informalities:
- a. On page 30 at line 22, page 31 at lines 21-22, and page 32 at line 17, please change "**O2**" and "**N2**" to --**O<sub>2</sub>**-- and --**N<sub>2</sub>**--, respectively;

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- b. On page 36 at line 24, please delete "using";
- c. On page 37 at line 25, please change "CuInSe<sub>2</sub>" to --CuInSe<sub>2</sub>--;
- d. On page 56 at line 16, please delete "1100,";
- e. On page 57 at lines 2 and 9, please change "1160 and 1162" to --1360 and 1362--;
- f. On page 59 at line 13, please delete "dice";
- g. On page 60 at line 29, please change "Figure 19B" to "Figure 21B";
- h. On page 65 at line 29 and on page 66 line 1, please change "integrated device 2340" to --integrated device 2430--;
- i. On page 73 at line 27, please delete the second occurrence of "2203";
- j. On page 78 at line 12 and on page 83 at line 27, please insert --3131-- after "first half";
- k. On page 78 at lines 15-16, please delete "as shown in step 3191.";
- l. On page 83 at line 25, please change "3100" to --3101--;
- m. On page 86 at line 24, on page 88 at line 13, and on page 91 at line 29, please indent the new paragraph; and
- n. On page 90 at line 30, please change "film includes" to --film includes--.

Appropriate correction is required.

7. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is

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requested in correcting any errors of which applicant may become aware in the specification.

8. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: METHOD FOR FABRICATING PHOTOVOLTAIC DEVICES.

### ***Claim Objections***

9. Claims 55, 99, 110, 122 and 134 are objected to because of the following informalities:

- a. In claim 55 at line 1, "a noble gas ions" should be changed to --noble gas ions--;
- b. In claim 99 at line 1, "CuInSe<sub>2</sub>" should be changed to --CuInSe<sub>2</sub>--;
- c. In claim 110 at line 2, both occurrences of "polycrystalline" should be changed to --polycrystalline--;
- d. In claim 122 at lines 2 and 3, "polycrystalline" should be changed to --polycrystalline--; and
- e. In claim 134 at lines 2 and 3, "polycrystalline" should be changed to --polycrystalline--.

Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

10. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11. Claims 106, 107, 111, 121 and 133 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 106 is indefinite because it depends from claim 107 and therefore does not further limit a preceding claim. It was assumed that claim 106 should depend from claim 40.

Claim 107 is indefinite because it depends from claim 108 and therefore does not further limit a preceding claim. It was assumed that claim 107 should depend from claim 106.

Claim 111 is indefinite because it depends from claim 112 and therefore does not further limit a preceding claim. It was assumed that claim 111 should depend from claim 110 because claim 112 recites a similar limitation.

Claim 121 recites the limitation "the transparent second film" in line 3. There is insufficient antecedent basis for this limitation in the claim. It is suggested that the phrase be changed to "the electrode first film".

Claim 133 recites the limitation "the transparent second film" in line 3. There is insufficient antecedent basis for this limitation in the claim. It is suggested that the phrase be changed to "the electrode first film".



***Claim Rejections - 35 USC § 102***

12. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

13. Claims 40-45, 47-55, 58, 78, 82, 83, 85-89, 109-116, 121-127 and 133-135 are rejected under 35 U.S.C. 102(b) as being anticipated by Tyan (U.S. Pat. No. 4,207,119).

Regarding claims 40, 78, 109, 113, 121, 124 and 133, Tyan discloses a method for making a photovoltaic (PV) cell comprising a transparent substrate **14** having a first electrode **16** formed thereon, a first semiconductor film **18** and a second semiconductor film **20** formed on the first electrode **16**, and a second electrode film **22** formed on the second semiconductor layer **20** (col. 6, lines 12-29; fig. 2). Leads **24** are attached to the first and second electrodes **16**, **22** (col. 6, lines 19-20; fig. 2). The semiconductor layers **18**, **20** are formed by depositing a semiconductor material using a deposition source by supplying energy to the semiconductor material to deposit the material in layers (col. 3, lines 28-45). Specifically, Tyan discloses the use of "sputtering or ion plating wherein ionized or plasma gas, respectively, is the activating medium" (col. 3, lines 35-40).

These methods form the semiconductor layers by supplying energized particles through

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ionization or by forming a plasma, which is a charged state of matter wherein an equal number of positively charged and negatively charged ions exist simultaneously.

Regarding claims 41-45, 47-55, 58, 82, 83, 85-89, 110-112, 114-116, 122, 123, 125-127, 134 and 135, Tyan discloses forming a PV cell comprising a first semiconductor layer **18** of n-type polycrystalline CdS and a second semiconductor layer **20** of p-type polycrystalline CdTe (col. 6, lines 12-29). The semiconductor layers are formed to a thickness of about 0.05 microns to about 5 microns, or about 50 nm to about 5000 nm (col. 6, lines 20-25). The semiconductor layers are deposited by a method of supplying energized particles using ion plating or sputtering, therefore supplying sulfur, cadmium and telluride ions to the layers as they are formed. Additionally, Tyan discloses forming the semiconductor layers in the presence of oxygen or argon gas, which have ionization energies of 12 eV and 15.75 eV, respectively (col. 7, line 65). The substrate is held at a temperature between about 300 degrees Celsius and 650 degrees Celsius (col. 4, lines 19-22).

Since Tyan teaches the limitations recited in the instant claims, the reference is deemed to be anticipatory.

14. Claims 40-46, 51, 53, 56, 78, 80-89, 95, 96, 101, 102, 104, 113-115 and 124-126 are rejected under 35 U.S.C. 102(e) as being anticipated by Walpita (U.S. Pat. No. 6,236,061).

Walpita discloses a method for making a PV cell using ion-assisted e-beam evaporation (col. 6, lines 11-12). The PV cell **60** comprises a substrate **64** having an

electrode film **64** formed thereon, a first semiconductor layer **68** and a second semiconductor layer **70**, and a second electrode film **76** formed on the second semiconductor layer **70** (col. 7, lines 32-55; fig. 4). The semiconductor layers **68**, **70** are formed using ion-assisted evaporation wherein "the ion beam energy is in the range 40 to 110 eV and substrate temperature in the range 25°C to 200°C (col. 6, lines 9-18). The semiconductor layer is comprised of a material including Si, SiC, GaAs, InGaAs, GaN and the like (col. 4, lines 50-53).

Since Walpita teaches the limitations recited in the instant claims, the reference is deemed to be anticipatory.

### ***Claim Rejections - 35 USC § 103***

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

16. Claims 57, 79, 108, 120 and 132 are rejected under 35 U.S.C. 103(a) as being unpatentable over Walpita (U.S. Pat. No. 6,236,061), as applied above to claims 40-46, 51, 53, 56, 78, 80-89, 95, 96, 101, 102, 104, 113-115 and 124-126, and further in view of Shiozaki (U.S. Pat. No. 6,222,117).

Walpita discloses a method for fabricating PV devices having the limitations recited in claims 40-46, 51, 53, 56, 78, 80-89, 95, 96, 101, 102, 104, 113-115 and 124-126 of the instant invention, as explained above in paragraph 14.

The method disclosed by Walpita differs from the instant invention because Walpita does not disclose forming a high quality region and a highly doped region in the third film.

Shiozaki discloses a method for forming a PV device wherein the semiconductor layers are formed by depositing the semiconductor materials by plasma chemical vapor deposition, which provides energized particles to the forming layers (col. 6, lines 48-55). Shiozaki discloses, "it is preferable that the joined semiconductor layers comprise an n-type or p-type first semiconductor layer, a weak n-type, weak p-type or i-type second semiconductor layer and a conductive p-type or n-type third semiconductor layer which is different from the first semiconductor layer" (col. 5, lines 7-15). The use of a weak n-type or p-type layer and a highly doped outer layer increases the conversion efficiency of the PV device by avoiding carrier recombination and decreasing the resistance at the interface between the highly doped region and the electrode.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the step of forming the semiconductor layers in the method of Walpita to form the third film having a first high-quality region followed by a second region that is highly doped as taught by Shiozaki because forming a first high-quality region followed by a second highly-doped region increases the conversion efficiency of the PV device. High quality regions increase the conversion efficiency of PV devices because of their lack of defects, and would therefore be desirable throughout the entire semiconductor area.

17. Claims 90-95, 99-101 and 104 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tyan (U.S. Pat. No. 4,207,119), as applied above to claims 40-45, 47-55, 58, 78, 82, 83, 85-89, 109-116, 121-127 and 133-135, and further in view of Kanai et al. (U.S. Pat. No. 5,468,521).

Tyan teaches a method for forming PV devices having the limitations recited in claims 40-45, 47-55, 58, 78, 82, 83, 85-89, 109-116, 121-127 and 133-135 of the instant invention, as explained above in paragraph 13. Tyan discloses forming a semiconductor layer comprised of a material including CdS and CdTe (col. 1, lines 7-9).

The method of Tyan differs from the instant invention because Tyan does not disclose the use of InP, ZnS, CuInSe<sub>2</sub>, ZnO or CdO to form the semiconductor layers.

Kanai et al. disclose a method for forming PV devices using plasma CVD (col. 1, lines 10-16). The semiconductor film is comprised of a material including Si, SiC, GaAs, InP, ZnS, CdS, CdTe, CuInSe<sub>2</sub>, ZnO and CdO (col. 30, lines 10-29).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the materials used in the method of Tyan to use materials such as InP, ZnS, CuInSe<sub>2</sub>, ZnO and CdO as taught by Kanai et al. because such materials can be equivalently deposited using the same techniques and the use of different materials provides the ability to optimize the PV device according to the desired bandgap of the semiconductor layers. CdZnS and CdZnO are alloys of CdS/ZnS and CdO/ZnO and would be expected to have similar properties to their component compounds and would be expected to function similarly.

18. Claims 90-94, 99 and 100 are rejected under 35 U.S.C. 103(a) as being unpatentable over Walpita (U.S. Pat. No. 6,236,061), as applied above to claims 40-46, 51, 53, 56, 78, 80-89, 95, 96, 101, 102, 104, 113-115 and 124-126, and further in view of Kanai et al. (U.S. Pat. No. 5,468,521).

Walpita teaches a method for forming PV devices having the limitations recited in claims 40-46, 51, 53, 56, 78, 80-89, 95, 96, 101, 102, 104, 113-115 and 124-126 of the instant invention, as explained above in paragraph 14. Walpita discloses forming a semiconductor layer comprised of a material including Si, SiC, GaAs, InGaAs, GaN and the like (col. 4, lines 50-53).

The method of Walpita differs from the instant invention because Walpita does not disclose the use of InP, ZnS, CuInSe<sub>2</sub>, ZnO or CdO to form the semiconductor layers.

Kanai et al. disclose a method for forming PV devices using plasma CVD (col. 1, lines 10-16). The semiconductor film is comprised of a material including Si, SiC, GaAs, InP, ZnS, CdS, CdTe, CuInSe<sub>2</sub>, ZnO and CdO (col. 30, lines 10-29).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the materials used in the method of Walpita to use materials such as InP, ZnS, CuInSe<sub>2</sub>, ZnO and CdO as taught by Kanai et al. because such materials can be equivalently deposited using the same techniques and the use of different materials provides the ability to optimize the PV device according to the desired bandgap of the semiconductor layers. CdZnS and CdZnO are alloys of

CdS/ZnS and CdO/ZnO and would be expected to have similar properties to their component compounds and would be expected to function similarly.

19. Claims 96-98 and 100-103 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tyan (U.S. Pat. No. 4,207,119), as applied above to claims 40-45, 47-55, 58, 78, 82, 83, 85-89, 109-116, 121-127 and 133-135, and further in view of Yamauchi (U.S. Pat. No. 4,365,107).

Tyan teaches a method for forming PV devices having the limitations recited in claims 40-45, 47-55, 58, 78, 82, 83, 85-89, 109-116, 121-127 and 133-135 of the instant invention, as explained above in paragraph 13. Tyan discloses forming a semiconductor layer comprised of a material including CdS and CdTe by means of ion plating or sputtering (col. 1, lines 7-9; col. 3, lines 35-40).

The method of Tyan differs from the instant invention because Tyan does not disclose the use of GaN, InGaN, AlGaN, InP, GaAs, InGaAs or InGaP to form the semiconductor layers.

Yamauchi discloses a method for fabricating PV devices wherein the semiconductor layers are formed using ion plating or sputtering (col. 2, lines 27-29). This process is used to fabricate semiconductor layers comprised of materials including AlN, GaN, GaP, GaAs, InN, InP, InAs or alloys thereof such as GaInP (col. 2, lines 19-29).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the materials used in the method of Tyan to use

materials such as GaN, InGaN, AlGaN, InP, GaAs, InGaAs and InGaP as taught by Yamauchi because such materials can be equivalently deposited using the same techniques and the use of different materials provides the ability to optimize the PV device according to the desired bandgap of the semiconductor layers. InGaN, AlGaN and InGaAs are alloys of InN/GaN, AlN/GaN and InAs/GaAs, respectively, and would be have properties similar to their individual constituents.

20. Claims 97, 98 and 103 are rejected under 35 U.S.C. 103(a) as being unpatentable over Walpita (U.S. Pat. No. 6,236,061), as applied above to claims 40-46, 51, 53, 56, 78, 80-89, 95, 96, 101, 102, 104, 113-115 and 124-126, and further in view of Yamauchi (U.S. Pat. No. 4,365,107).

Walpita teaches a method for forming PV devices having the limitations recited in claims 40-46, 51, 53, 56, 78, 80-89, 95, 96, 101, 102, 104, 113-115 and 124-126 of the instant invention, as explained above in paragraph 14. Walpita discloses forming a semiconductor layer comprised of a material including Si, SiC, GaAs, InGaAs, GaN and the like (col. 4, lines 50-53).

The method of Walpita differs from the instant invention because Walpita does not disclose the use of InGaN, InP or InGaP to form the semiconductor layers.

Yamauchi discloses a method for fabricating PV devices wherein the semiconductor layers are formed using ion plating or sputtering (col. 2, lines 27-29). This process is used to fabricate semiconductor layers comprised of materials including



AlN, GaN, GaP, GaAs, InN, InP, InAs or alloys thereof such as GaInP (col. 2, lines 19-29).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the materials used in the method of Walpita to use materials such as InGaN, InP and InGaP as taught by Yamauchi because such materials can be equivalently deposited using the same techniques and the use of different materials provides the ability to optimize the PV device according to the desired bandgap of the semiconductor layers. InGaN, AlGaN and InGaAs are alloys of InN/GaN, AlN/GaN and InAs/GaAs, respectively, and would be have properties similar to their individual constituents.

21. Claims 105-107, 117-119 and 128-131 are rejected under 35 U.S.C. 103(a) as being unpatentable over Walpita (U.S. Pat. No. 6,236,061), as applied above to claims 40-46, 51, 53, 56, 78, 80-89, 95, 96, 101, 102, 104, 113-115 and 124-126, and further in view of Matsuda et al. (U.S. Pat. No. 5,571,749).

Walpita teaches a method for forming PV devices having the limitations recited in claims 40-46, 51, 53, 56, 78, 80-89, 95, 96, 101, 102, 104, 113-115 and 124-126 of the instant invention, as explained above in paragraph 14. Walpita further discloses forming the PV devices on polymer or metal film substrates (col. 3, lines 25-53).

The method of Walpita differs from the instant invention because Walpita does not disclose supplying the substrate on a roll or passing the substrate over a curved thermally controlled object.

Matsuda et al. disclose a method for forming a semiconductor film on a metal or polymer film using a plasma CVD process (col. 5, lines 37-54). The temperature of the substrate is controlled by passing the substrate over rollers having cold water flowing through them (col. 4, lines 31-33; col. 24, lines 47-50; fig. 12A-C). The substrate can be wound into a roll form (col. 5, line 66 to col. 6, line 2).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the substrate used in the method of Walpita to use a substrate supplied in a roll form as taught by Matsuda et al. because providing the substrate on a roll allows the PV device to be manufactured in a continuous fashion.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Walpita to incorporate cooling rollers as taught by Matsuda et al. because by using the cooling rollers, "the temperature to be controlled by the means for heating and cooling the substrate is changed in accordance with the movement of the substrate" (col. 6, lines 29-34).

### **Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian L. Mutschler whose telephone number is (703) 305-0180. The examiner can normally be reached on Monday-Friday from 8:00am to 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (703) 308-3322. The fax phone numbers

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for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

A handwritten signature in black ink, appearing to read 'Nam Nguyen', with a stylized, flowing script.

blm  
September 13, 2002

NAM NGUYEN  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700